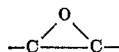


ously described, fluids, and generally have viscosities in the range of from about 500 centistokes to 100,000 centistokes, at 25° C. Preferably, the material is a dimethylpolysiloxane fluid having silanol terminals with a viscosity of from about 500 centistokes to 22,500 centistokes at 25° C. However, when it is desired to form a clear, transparent, high strength material, such as for potting, the silanol-terminated fluid of Formula 3 must have a refractive index in the range of from about 1.45 to 1.46. This can be accomplished by forming a fluid of Formula 3 where the substituent R' is both methyl and phenyl, the amount of phenyl being within a particular range. For a silanol-terminated diorganopolysiloxane fluid with a refractive index of from 1.45 to 1.46, from 11% to 13.3% of the R' substituent should be phenyl, with the remainder being substantially all methyl.

To form the high strength, transparent material any of a variety of reinforcing silica fillers can be employed. These are processed silica fillers which generally have a surface area of from about 125 to 225 square meters of surface area per gram of material. Included among the reinforcing silica fillers are such precipitated silicas as Hi-Sil X303, manufactured by Columbia Southern Chemical Co. and Ultrasil VN-3, manufactured by Füllstoff-Gesellschaft, and fumed silicas, such as Cab-O-Sil, manufactured by Godfrey Cabot, Inc. Prior to incorporation in the mixture of the silanol-terminated diorganopolysiloxane fluid and the resinous copolymer of $R_3SiO_{0.5}$ units and SiO_2 units, these reinforcing silica fillers can be treated with other organosilicon materials. The treatment of the silica fillers with organosilicon materials are described, for example, in U.S. Patents 2,938,009—Lucas and 3,004,859—Lichtenwalner. These patents describe the treatment of silica fillers with such materials as organochlorosilanes and organocyclopolsiloxanes.

The catalyst which is employed for curing the composition of the present invention can be selected from a large group of catalysts which have previously been employed for curing organopolysiloxane compositions having silicon-bonded hydroxyl groups. Among these catalysts is the combination of an organic compound containing an epoxy group, that is, a group with the formula:

(4)



and an amine selected from the class consisting of primary amines, secondary amines, and tertiary amines, as described in U.S. Patent 3,205,197—Cohen et al. The portion of the Cohen et al. patent relating to this catalyst system is hereby incorporated by reference. Additionally, tin soaps and lead soaps can be utilized for curing the composition of the present invention. Included among these tin and lead soaps are such materials as stannous octoate, dibutyltin dilaurate, lead octoate, and other such soaps having radicals such as the resinate, linoleate, stearate, oleate, and even lower acid radicals, such as acetate, butyrate, etc.

A wide latitude is allowable in the amount of the previously described materials utilized in the present invention. For each 100 parts of the silanol-terminated diorganopolysiloxane of Formula 3 there can be employed from about 5 to 25 parts, by weight, of the resinous copolymer of $R_3SiO_{0.5}$ units and SiO_2 units. This resinous copolymer acts essentially as a cross-linking agent for the silanol-terminated diorganopolysiloxane of Formula 3. The filler level used in the present composition can vary from about 15 parts to 65 parts, by weight, of filler for each 100 parts of the silanol-terminated diorganopolysiloxane fluid of Formula 3 and the catalyst level can be varied from about 0.02% to 1% of the metal in the metal soap or the amine in the combination of the organic epoxy compound and amine, previously described, based on the total of the silanol-terminated diorganopolysiloxane and the resinous copolymer of $R_3SiO_{0.5}$ units and SiO_2 units.

To employ the composition of the present invention for potting or encapsulating, the resinous copolymer of $R_3SiO_{0.5}$ units and SiO_2 units, the silanol-terminated diorganopolysiloxane fluid, and the reinforcing silica filler are merely blended together in any convenient fashion such that a homogeneous mixture is insured. This mixture can be catalyzed immediately or can be stored for an extended period of time and catalyzed immediately prior to use. In any event, the catalyst should not be added to the mixture of the three components, just described, until just prior to use. Without catalysts, the mixture can be stored for long periods, for example, from six months to one year or more, without adverse effect. However, on addition of the catalyst the composition begins to cure and, even at room temperature, the pot life is less than 24 hours.

When it is desired to form a conformal coating from the composition of the present invention, it is often advantageous to apply the composition from a solvent solution to reduce the working viscosity of the mixture so as to allow even the intricate detail of the item to be coated to be filled with the composition of the present invention. When a solvent solution is desired, the solvent employed can be selected from a broad range of hydrocarbon materials, either aliphatic or aromatic. Among the solvents which can be used are such materials as pentane, hexane, heptane, cyclohexane, cyclohexene, benzene, toluene, xylene, etc. The solution should contain between 30% and 75% solids.

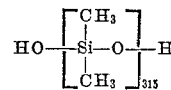
The composition, after addition of catalysts, will cure at room temperature in about 24 hours and attain its ultimate properties in about 96 hours. If the mixture is heated to 100° C., cure can be accomplished in about 1 hour, while at 150° C. cure is accomplished in about 30 minutes. Because of the expansion coefficient of the organopolysiloxanes, 150° C. is about the maximum temperature which can be used for curing or the potting or coating material will expand to such a degree that an accurate mold or coating is not obtained. With the solvent systems, a temperature of at least 80° C. should be utilized to insure removal of solvent prior to firming of the organopolysiloxane composition.

The following examples are given as illustrations of the practice of the present invention and should not be considered as limiting in any way the full scope of the invention as covered in the appended claims. All parts are by weight.

Example 1

A mixture was prepared containing 500 parts of a silanol-terminated dimethylpolysiloxane fluid with a viscosity of 750 centistokes at 25° C. and an approximate average formula:

(5)



and 150 parts of a fumed silica filler with a surface area of about 200 square meters per gram treated with twenty parts of octamethylcyclotetrasiloxane according to the method of the aforementioned Lichtenwalner patent. This mixture was blended in a change can mixer at a temperature of about 100°–150° C. until it was homogeneous (about 90 minutes). To 130 parts of this mixture was added 15 parts of a resinous copolymer of $(\text{CH}_3)_3\text{SiO}_{0.5}$ units and SiO_2 units in a ratio of 0.77:1, the resinous copolymer was blended in and the new mixture deaerated. The mixture of the silanol-terminated dimethylpolysiloxane fluid, the resinous copolymer of $(\text{CH}_3)_3\text{SiO}_{0.5}$ units and SiO_2 units, and the treated fumed silica filler was catalyzed with 3 parts of a 10% solution of tin octoate in octamethylcyclotetrasiloxane, the catalyzed mixture placed on a tin-plated casting tray and cured for 17 hours at a temperature of 100° C. A 100 mil thick strip with dimensions of $\frac{1}{4}$ inch by 4 inches was cut from the slab